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A scheme is presented for the development of perception and learning in which a hierarchy of skills begins with innate response systems and progresses through gross motor activities to more specialized motor systems represented by eye-hand coordination. The next stage of development, the control of ocular muscles, is discussed and the development of speech and of associations through the awareness of percept in time and space are described. The necessity for the intactness of each system for adequate learning and the crucial nature of ocular motor patterns in speech development and learning are considered. The scheme is evaluated by Archie Silver and Rosa Hagin. (LE)

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SYMPOSIUM

PERCEPTUAL TRAINING FOR CHILDREN WITH LEARNING DIFFICULTIES

WEDNESDAY, MAY 5, 1965

FROM 1:00 TO 4:00 P.M.

EC 000 810

Sponsored by: Middlesex General Hospital Speech and Reading Clinic. Department of Educational Psychology, Graduate School of Education, Rutgers The State University. Middlesex County Mental Health Clinic, New Brunswick. Midland School for Brain Injured Children. New Jersey Association for Brain Injured Children.

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"PERCEPTUAL TRAINING FOR CHILDREN WITH LEARNING DIFFICULTIES"

This Symposium was concerned with those children who have good intelligence but have difficulty learning academic skills by conventional methods.

Our speaker, Dr. G. N. Getman, famous for his work in the area of perception and vision, spoke on the underlying developmental sequences that must be experienced by the child before adequate perception is present.

Dr. Getman's theories were discussed by leading authorities in the field of learning disabilities: Dr. Archie A. Silver, Dr. Samuel D. Clements and Dr. Rosa Hagin.

Speaker: G. N. Getman, O. D., Chairman, Section on Children's Visual Care and Guidance, Optometric Extension Program (International) Inc., Duncan, Oklahoma. Well known author of many books and pamphlets in the area of perception including How to Develop Your Child's Intelligence, The Physiology of Readiness (with E. R. Kane, Ed.D.) etc.

Discussants: Samuel D. Clements, Ph.D., Associate Professor of Pediatrics and Psychiatry and Director of the Child Guidance Study Unit at the University of Arkansas Medical School.

Archie A. Silver, M.D., Associate Professor in Clinical Psychiatry, New York University Medical Center, New York School of Medicine, Psychiatrist in charge of Children's Section, Mental Hygiene Clinic, Bellevue Hospital, N. Y.

Rosa I. Hagin, Ph.D., Instructor in Clinical Psychology in the Department of Psychiatry, New York University School of Medicine, Psychologist, Psychiatric Clinic, Greenwich Hospital, Greenwich, Conn.

DR. G. N. GETMAN: Thank you very much, Dr. Bardon. I'm particularly pleased to be here in New Jersey for an obvious reason: your interest in a subject that's of interest to me. And so I hope this afternoon in the time available that we can at least open the subject I think needs a little more exploration and a little more careful inspection than it has been given.

I was particularly struck with the title of this symposium, "Perceptual Training for Children With Learning Difficulties." I was struck by the title because – well, first of all, it didn't tie us down to certain categories; in fact, it opened a field that applies to such a large population of children. We do not have to stumble over the usual diagnostic categories, which I think will have to be reconciled at a later date; I do not think we can do it at this moment. I should speak for myself – – – at least from my professional viewpoint, we are not ready to establish categories and labels for children with learning difficulties.

The second reason the title struck me is because within my profession we have been providing perception training for quite a number of years. So I will get into the material that I would like to present here for your consideration, and for a very critical analysis by my colleagues on this panel. I would like to establish very briefly but as clearly as I can what my position is.

Way back in the dim past when we were having presidential elections, I turned most of it off because I could not find anyone that would state their position so that I could understand it – and I do not want to get in the same situation: I want to state my position as clearly as I can, because I think it will help us to look at some of the things we will be discussing. First of all, I am an optometrist, dealing with the clinical diagnosis and guidance of vision problems. Although I travel almost 30,000 miles per year on airlines, and attended and participated in some 19 or 20 meetings such as this, and many more within my own profession, I am home most of the time. I am home enough, now, thank goodness, so that my children recognize me.

What I am trying to say is that I am a clinician and I spend the maority of my time in a practice that deals with some of the perceptual problems of children, and particularly with those problems that interfere with their learning processes in the academic systems of today. My philosophical position is a little more difficult to describe. If I were to describe myself I would say it thus: I am a functional, developmental, unitarian behaviorist. (LAUGHTER) I am considerably concerned

with what the child does as he grows and organizes all of his inter-related action systems through time – as he has to meet the tasks of the culture. And the performance I see in the child, because I am a clinician, is more important to me than the armchair philosophizing on cause and effects.

Our concern here today, and our primary interest I am sure, is that group of children unable to profit and succeed in standard classrooms. You see, we have been dealing with these for a number of years because our first problem, as optometrists, came as we had to differentiate between sight and vision. The literature today, the most up-to-date literature, from many fields dealing with performance, uses these terms interchangeably. As we see it now, sight is very little more than the reaction of the eye to light; the reaction of the ocular system to light contrasts. Vision is far more involved.

We learned this the hard way as clinicians. First of all, it was the fallacy of the acuity criteria; because we would see individuals who on standard acuity criteria demonstrate 20/200, 20/400, etc. and still operate tremendously well, they would see things that they were not supposed to see with that kind of acuity. And in contrast to these we saw the youngsters daily with 20/20 or better who were miserable failures in the visual tasks of the classroom.

This is certainly a contradiction which has to be reconciled. And so we found ourselves deep in this problem of perception. At the same time we found ourselves deep in consideration of vision problems. We found many years ago that there were uses for lenses other than to increase clarity; we found, because of our functional approach, we had to give more attention to performance than the measurement of the eye structure. A great many children profited tremendously with lenses that they wore up close -- not because they didn't see well – but because the lenses did something – (and we won't go into the details here) to enhance their performance. This brought a whole new area of perception to our attention.

We were considerably interested in the fact that these characteristically were the youngsters in the lower third of any classroom, academically. My good friend, Dr. Ray Barsch, says that I'm guilty of throwing out "stretchers". What he means is, I'll make a statement and leave it dangle. But still I can't say it any other way. We were struck by the fact that when we used lenses for something more than acuity, one of the first changes we saw was an improvement in handwriting. This opened another area of performance to be considered. What in the world has a simple lens got to do with handwriting?

Next, we found we had the same syndromes, the same sequences describing difficulties and problems, that everybody else was putting into the literature.

I have a paper here that was written by Dr. Clements in '62, in which he discusses coordination. You may wonder why we optometrists were interested in coordination as described by Dr. Clements. We frequently find a coordination problem between a pair of eyeballs. This also became a part of the coordination syndrome that everybody else was recognizing. We did not use Bender Gestalt tests, and the sort of tests that were used by my colleagues on the panel, but still we would find the same types of difficulty, the same kind of performance sag in their writing, in their picture drawing, in their incomplete man. Then the work of Dr. Silver and Dr. Hagin in right and left orientations were of interest to us also, we found the same syndromes describing a visual problem.

We know that being clinicians has not allowed us to do some of the proving we would like to do. At the same time, being clinicians, we are not prepared to do some of the research, we would like to do. We would prefer that some of these ideas be presented; some of the results and some of the programs and some of the models be laid out for inspection, as I am doing it here today. Then those people who are in a position to do the proving take it apart. As clinicians, we are involved in another way; it's awfully hard to be objective at the level we must operate in a daily clinical practice; it is much better if somebody else can do it.

What I am saying very briefly: we are not in a position to stand up and say, "We know this is true because the statistics are as follows." I think one of the reasons, for our being here is that maybe we are not even ready to put it into the test levels yet, because maybe we are not really sure – what questions have got to be asked.

On this basis then, let us get to something we can discuss. I would like to make one other comment. I am going to discuss this on the basis of observable performance in children. I am not qualified to discuss the neurology. I am not qualified to discuss the pharmacology. And I cannot see these "performances" anway. These areas demand something more than the majority of us in this room are qualified to observe.

So let us take a look at the child as we can actually see him operate. I understand that the majority of us in the room have our hands on children daily. Therefore it seems to me that if this afternoon is to be productive, we should look at what we can see happening, and what can we do about it.

First of all, I would like to illustrate in this fashion. (See Chart) This is merely a diagram around which we may organize our thinking. The bottom row of beads indicate those systems that I think are the genetic action systems. These are the action systems the child brings with him, he brings with him because he's a member of genus homo. These are not all of the systems, of course. These are systems we can all observe, that give us some idea of whether or not this child has the systems he needs in order to organize some degree of perceptual skills.

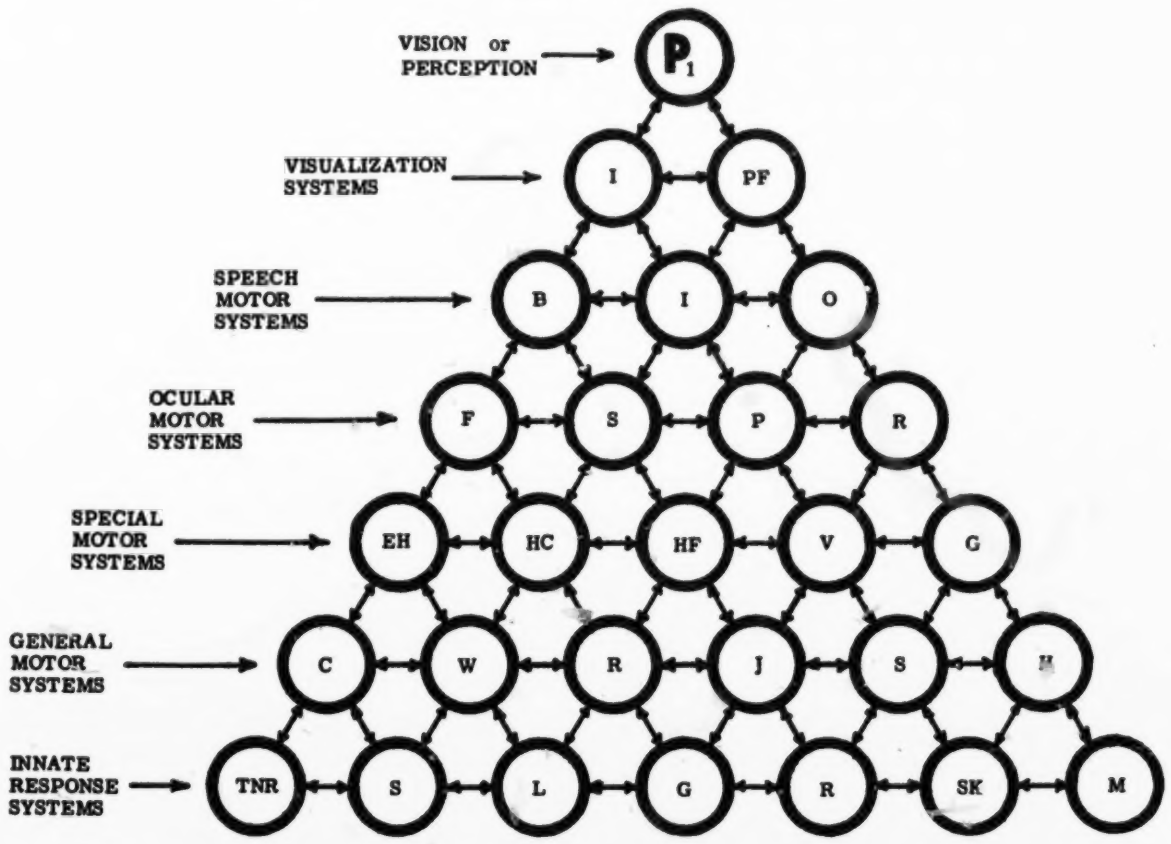
I would like to describe these as nature's method of teaching *new* dogs *old* tricks. These he brings with him by the gene complex that makes him a human being; and if these are all present, fine and dandy: he's got that much more going for him. If these are not present, there will be some deficiency that creates some problems. Let us identify them quickly. They are called, in our diagram, the *innate response systems.* These in many instances, are considered completely reflex, meaning – as I interpret it – it is a sort of an all or none, it's an off and on thing, and it happens when conditions are right – period! I think these systems are more dynamic than this.

The first one at the bottom is the TNR: the Tonic Neck Reflex. This reflex action is discussed a great deal – particularly at this moment by some people who, in my opinion, load it with too much meaning, and attempt to diagnose too many things from it. I have a little difficulty relating TNR to reading skill; I think there are some steps in between that have to be considered.

The Tonic Neck Reflex. the early patterning of posture in a child. There are two of these that appear in the literature: First, The TNR of the infant when in the sleeping position. The sleeping TNR, described and illustrated now in a number of publications, is not the same thing as that seen in the moment of rest, and wakeful alertness in the infant. The sleeping TNR is usually described while the infant lies on his stomach. There are a couple of things I would like you to do in the privacy of your bedroom – I won't ask you to do it here. Put yourself on your stomach and see what kind of a posture you are going to take to avoid suffocation. On this basis, you are going to bring your arm up so that you have room to breathe. This is the sleep TNR.

The TNR is compietely different. The head is not turned towards the bent arm; the head is turned towards the outstretched arm. I think this is a very important moment in the infant's life because I have a feeling that this is the beginning of eye-hand coordination.

The Visuomotor Complex



LEVEL #1 INNATE RESPONSE SYSTEMS

TNR	Tonic Neck Reflex
S	Startle
L	Light
G	Grasp (and Manipulate)
R	Reciprocal
SK	Stato-kinetic
M	Myotatic

LEVEL #2 GENERAL MOTOR SYSTEMS

C	Creeping
W	Walking
R	Running
J	Jumping
S	Skipping
H	Hopping

LEVEL #3 SPECIAL MOTOR SYSTEMS

EH	Eye Hand combinations
HC	Hand Combinations
HF	Hand Foot combinations
V	Voice
G	Gesture

LEVEL #4 OCULAR MOTOR SYSTEMS

F	Fixations
S	Saccadics
P	Pursuits
R	Rotations

LEVEL #5 SPEECH MOTOR SYSTEMS

B	Babble
I	Imitative
O	Original

LEVEL #6 VISUALIZATION SYSTEMS

I	Immediate
PF	Past Future

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This is when he finds out, perhaps, that, "Ah, ah, those fingers belong to me; I can see 'em wiggle; I can wiggle 'em."

I also have a little difficulty with this business of right and left TNR and its being the determinant of handedness. As I have watched infants, if they are given the freedom of the crib, if there are changes of position of crib in the room, they explore both TNR's quite extensively. I am not sure at this moment that the TNR does determine handedness. I am not sure that it doesn't. But I raise the question: shouldn't we look beyond the TNR and check on other factors that may be equally as pertinent.

The TNR, as I see it then, is the posture from which a child makes his movements. This is the moment of his, "Where I start." The TNR is more dynamic than just a passive posture. Further, if we're going to talk about spatial orientation as it is described in the matter of perceptual disabilities, it seems to me that spatial orientation has to start somewhere very early in life by finding out where I am before I can find out where space is. I think the TNR posture may be a point of starting to find out where I am by making the next movement.

Let us look again at the line across the bottom of our chart. By the way, I don't know how to order these beads. I don't know that one's more important than the other. I have a feeling that no one system in a human being is more important than another system: they are all important to the totality. So please do not assume that these are ordered across the bottom on the basis of their importance, or their significance; I don't know this. But I do have the feeling that these are the systems we can look at that contribute to this total thing we call perception.

The second bead in the bottom row, is marked "S". The Startle Reflex: a loud noise – quick movement, this sort of behavior. I see this as a sort of triggering device; if startled the youngster becomes less passive. On this basis maybe he can learn then to go into movement; this is how *he* gets things started.

The Light Reflex is another action system represented by the beads. It doesn't come in quite as early as the Startle Reflex. Let us consider the light reflex, as evidenced by pupil change in the eye, as being an indicator of adaptability. At least it is evidence this organism adapts to changes in its environment – and we will all agree I am quite sure, that ranges of adaptability are tremendously important in the organization of a human being, whether we talk about chemical ranges, sugar ranges – or whatever they are; or strictly ranges of performance.

The next bead is G, for the grasp reflex, illustrated beautifully as the palmar grasp – you put something across the palm of the infant and he will take a hold of it. I would like to extend this just a little bit, because I think out of this grasp reflex may well come the child's ability to manipulate and inspect. It is a whole lot more important than the grab – well, let me say it another way – there's more to it than just grabbing and turning loose. He grabs and takes hold of it and he says, "Well, what does that feel like?"

When the child manipulates with his grasp reflex, he is using his grasping machinery to explore; it's more than just grabbing or not grabbing. It is the first manipulation of the external world.

Next, across the bottom is a bead labeled R for Reciprocal Reflex. And I think we forget this, especially now as when we become so entranced with ideas of dominance. By the way, another friend of mine says everyone is entitled to one emotional outburst per day – I am trying to control this very carefully, but since it is a subject that hits me very close inside, it may be an explosion – I want to talk about this reciprocity for a moment. I think that we forget the basic structure of the human being when we forget the reciprocity of the architectural halves of the body structure, and get ourselves too involved and too entranced with ideas of unilaterality. In the human we have a bilateral structure, a reciprocating structure, and in my opinion the surest way to downgrade the performance of the human organism is to push him toward unilaterality, because you have taken half of him away.

The reciprocal reflex is illustrated all through this human action system in thrust and counter thrust, balance and counterbalance, and opposite movements to balance productive movement; you and I could not walk without reciprocity of the architectural halves. In good performance there has to be lots of reciprocity, so much so that we had to go beyond such labels as bilaterality and talk about unity. This is why I said I am a unitarian. (LAUGHTER) The reciprocal reflex – the organization of an architectural duo, into a reciprocating unity.

SK, that's the next bead across the bottom. The Stato-Kinetic Reflex. This also seems to me to be the genesis of and the point of origin for, the readiness to act. Let me see if I can give you an adult example. I have a feeling that when the fancy diver hits the end of the board – not the diving end – the ladder end – he stands there for a moment, to get his stato-kinetic system ready for diving. If it is not ready before he steps along the board, he belly-flops, no

matter what happens from that point out to the end of the board. The golfer does this. You and I do it when we write our name: we pick up the pencil; we're ready to go into action long before that pencil ever hits the paper. As in the child, this is the stage of getting ready to act; organizing oneself in order to act effectively.

The last bead: the Myotatic Reflex. Here the infant gets what I think is his mechanisms for kinesthesis and proprioception. This is the stretch reflex. As I watch infants stretching and yawning and pushing themselves into the extension of postures, I wonder if this isn't the time perhaps when they find out they have muscles. I think these actions are more dynamic than just getting tired and hungry so they go to sleep and eat and wake up and stretch some more just to get hungry and tired. Perhaps this is the time when the child finds out, "Ah, I've got a system; I've got a muscle system; I can feel it."

I put these systems on the diagram and labeled them for a reason; – not because we can do much about these, particularly at the early stages, but I definitely have the conviction that if we are training perception in a child, he *must be aware* of the systems he brings with him and which are available to him. We talk at great length about motor training. My clinical experience, particularly with the type of children many of you are interested in – brain-injured children – has shown me that movement for movement's sake does not produce anything! Movement to explore and extend reciprocity – – ah, that's something else again!

If you could inspect this diagram very closely, you would see that it's full of double-headed arrows, because I want to indicate also that none of this is a one-way street. There are all kinds of internal relationships. When you have activated one area, it activates another area. I am of the strong opinion that nothing that goes on within the envelope of the skin, even at the end of the fingertip, is an isolated event: something happens all the way through the system. Actually all of these items I've identified are so closely interrelated that we only take them apart for discussion. In the living, acting, performing child we have to recognize they are all there, but they are never piecemeal.

Now let us look at the second row of beads. The first in General Motor Patterns I have labeled as C: *Creeping.* Here is where I might have another emotional explosion. Creeping is not a panacea. Creeping *has* a very dynamic purpose. I don't know for sure – I have a feeling that I may have written the purpose of creeping into the

literature almost before anybody else did, or at least what I thought the purpose was. I did not think then, and I know now in my own mind, that creeping is not a cure for all reading problems even though there are such things as motor clumsinesses and right-left problems, confusions, and so on, demonstrated by children with learning problems. I do think creeping has a very definite purpose and here again I would like to recommend that, in the privacy of your own bedroom, you get down on all fours and explore this action pattern. Not as an adult would do it, but feel your way through it as if you had never done it before, and find out what the different patterns of creeping do for you. Where do you feel it when you lift an arm to put it forward in a creeping position? Where do you think you feel that action? Where would you guess? Do you want to make a guess? Where would you say? Where?

WOMAN: In the shoulder.

GETMAN: Go home and try it! (LAUGHTER) If you can really cut out habits, maturity and all the rest of your adult patterns, you will be very surprised to find that you feel it in the lower back and opposite buttock. The lower back and *opposite* buttock. I see creeping as a very definite way, and possibility, of accenting this reciprocity, of putting these architectural halves together. I think it is related to the tonic neck reflex, that it is an extension of this in a certain way, because as I indicated I think the tonic neck reflex is a whole lot more than just a head turned, an outstretched hand; I think it contributes to early eye-hand organization; and I'm quite sure if you will watch an infant – not yourself, because it won't work with you – if you watch an infant in the early creeping stages: you will see that he not only watches that hand he is putting forward, he is aiming himself, at objects in his surroundings.

Now, I am saying something here, I am implying something I want to nail down. I made several references to eye-hand. I made particular reference to eye-hand in the tonic neck reflex, and I also have made a reference to eye-hand in the creeping act. I would defend this to the bloody death: There is no action pattern profitable to a child, fully profitable to a child, unless it is goal-directed and has a visual-directing, visual-steering component.

I am now talking about vision as something different from sight. Because I am also talking spatial orientation. I am also talking about the reasons for the visual system. Any child that's put into a creeping act without a visual goal and a visual purpose, is not going to profit from creeping – although he may be the best creeper in the world

creeping is a hard way to earn a living. Now I can get off my emotion outburst on creeping.

The next bead is W – Walking. Here again we need to look very carefully at this thing we call the general motor act of walking. And I refer you to children. Let us consider, in broad categories for example, the mongoloid versus the brain-injured child. They both learn to walk, but they can both learn it so well that it may be disjunctive from all other actions. Walking can become the same kind of an act as the little doll that you put on a slope, flip it and it rocks down the slope; this sort of walking can be a very alternate act without reciprocity.

We need to consider the walking actions, not just as an alternate act, but as an exploration of total unity. We can then consider running, jumping – the rest of these actions are labeled in the diagram. I won't spend too much time on running, jumping, skipping and hopping. These are all actions, as I see it, to extend exploration of general movements; to develop not only a dynamic bilaterality, reciprocity and unity, but the variations within it, which appear to be unilateral but never are. They *appear* to be unilateral. Hop on one foot. Is this a unilateral action? No! The foot you hold up is just as important as the one that is on the ground. There must be a unity between them or you will not accomplish this unity.

The same is true in walking. It looks alternate. It looks like a shift of unilateralities. It isn't.

The next row on the diagram is level 3: Special Motor Systems. By special motor systems I mean those systems that let us manipulate the world around us, and do something about it. Sure, we have to move ourselves generally through space. We have to move ourselves generally around the world. But after we've moved, what do we do about it? Now we've got some special motor systems we can use.

I mentioned the eye-hand combination. It is the first bead: EH. This has been of great interest to us within my profession because in the past, it has been taken so for granted. Much of the literature discusses it as if this child has it and this child hasn't got it – period; without realizing that this is an area of practice and development. We take it so for granted because we have been using it for so many years. If you stop to analyze every single thing we do all day long, you would find most of our day is spent in eye-hand activity.

Last summer I had the privilege of teaching a course at Texas Woman's University, and for a mid-term exam I gave them this single, open-book type question: "Come in Monday morning having

listed the perceptual decisions involved in coloring, cutting and pasting." As you know *every* youngster *has* to cut, color and paste; this is part of his life; he has to learn to do this. This is eye-hand activity to practice and develop eye-hand coordination.

The next bead on this level is HC: Hand Combination. I want to go back very briefly to this business of unilaterality versus bilaterality versus unity. Is writing a one-handed act? No. It hadn't better be, too frequently it is. The child has so many possible ways of learning a way to do a thing that he can isolate certain parts and learn only splinter skills. He can seem to do pretty well – but he's lost a whole part of himself that he could bring in the act. Sure we hold a pencil in one hand; it's a little hard to hold it in both. But the other hand ought to be in there doing something about posture, orientation, paper orientation – there should be a hand to hand relationship.

So hand-combination is a tremendously important area. Everybody will admit immediately that cutting involves hand-combinations. And then we forget it sometimes when we talk about pasting and painting.

The next bead is HF, the Hand-Foot combination. Remember, I'm talking about special motor patterns that allow us to manipulate the world in which we must operate. By simple observation – we can tell whether the proper arm is swinging with the proper leg in a walking posture. This is a hand-foot combination. But I think it has more importance than this. The hand-foot combination I would like is the one related to – as I mentioned a while ago – the purpose of a special movement pattern: the manipulation of the world around us. Richard Held and his associates at Brandeis have shown that spatial orientation does not develop if you are moved through space by someone else; it only develops when you move yourself through space and make decisions about your movements. This involves eye-hand in the child, because he can't possibly move himself through space and explore his world without getting his hands into the act. This becomes an organization of verification of his spatial position after he's walked through it. This is a hand-foot combination.

Next I've listed voice, and I've listed it very carefully here as voice, not as language. Again, how do we manipulate our environment? The baby learns very quickly to use his voice to manipulate his mother. This relates to hand-combination; it relates to hand-eye; it relates to hand-foot and it relates across the board, because certain voices bring certain results which involve certain parts of him.

The next bead is G: Gesture. Here facial expression is the example

I'll use for the moment. This is a gesture. We think of gestures usually as waving arms. But mother has learned very early how to use facial gestures to put emphasis on her voice. So do babies.

These are some of the special motor patterns the child can use then to manipulate his environment and its contents. Now, very quickly, let's drop back, to make the point again that we are looking up and down the diagrammatic scale, as well as across it.

Drop clear down to the grasp-reflex. I extended it, you remember, to include something of manipulation. If a child learns to use voice, gesture, eye-hand, eye-foot – all these special motor patterns – to manipulate his environment, he's doing something about his grasp on his environment.

Now, I will make a stretcher and I will leave hang for your consideration, because I can't do more than give you my feelings on it. I have the strong feeling that this thing we call the grasp reflex – way down here at the bottom of our diagram – has a great deal to do with attention span, and that as a child develops his attention span in any activity: through his general motor patterns, through his special motor patterns, and so forth – he is building on that grasp reflex and elaborating it. And because development is a continuity through time and a totality through time, as he develops attention span he also does something about that grasp reflex, but it is no longer *a reflex;* it is something else now and we can not measure it the same way that these innate reflexes are usually measured and diagnosed. However, it is still part of the same basic process!!

The next level; level 4, is the ocular-motor patterns of the ocular-motor systems. Here is a multiple system; it is a motor system and an information receiving system which, all authorities agree, is a pretty important system, especially in such things as spatial orientations.

Here is a system that we take so very much for granted. The literature talks about eye-movement abilities and eye-movement inabilities. You can go to the literature and – like this business of dominance, (which is another emotional outburst that I will leave alone for this moment) – when you talk about ocular motilities you can quote whichever author you want to back up your remarks. I will say it the other way around: you can choose whichever author you want to support your belief. On the other hand, we do see certain characteristics, particularly in the child labeled brain-injured, short attention span, hyper-kinetic – you're always scraping him off the walls, and so on. Characteristically he has practically no ocular

motility control. And surprisingly, when we assisted children in this particular ability, we saw organizations and improvements that we did not hope for, that we did not expect in his general performance.

All the clinical evidence now points to a very high relationship between ocular motility control and attention span. Will you do some simple observations for me? You can do this in about 5 minutes. Next time you are in a classroom, pick out two or three youngsters that you judge to have the least, or the shortest attention span. Pick up a pencil or a pen-light as a target and move it slowly in front of their eyes. Give them all the encouragement you can to watch this target. And then by simple contrast go over and pick out the youngsters with the greatest, the best attention span, and do the same thing – and see what differences you see in their control of eye movements.

Let us see if we can simplify it. As I see it it is as simple as this: here is a youngster at a task; you put him at it and it is a very carefully designed task that is supposed to produce tremendous results, – because we adults designed it. (LAUGHTER) He starts at this task, but a classmate moves, or a bird goes by a window. Instantly this little guy's attention is over there, and the minute his head is over there the rest of him goes, too. So now you have to bring him back to the task. O.K. Something happens over here. Wham! Off he goes. You must go get him and put him back. However – if he has ocular motilities, – if he has freedom of ocular movement, – he can take a glance to be sure the object that moved is not going to hit him. He stays at the task because his head didn't leave it. The minute head leaves the task you have lost the child. His head leaves the task when his eyes cannot move. We found youngsters handling distractions, manipulating the situations – once they had achieved some ocular motor control.

We have four beads on this level: F, for Fixations, meaning that a child can hold his eyes on a task. This we could relate clear back to the startle reflex, the light reflex, the reciprocity reflex, and in some degree to all the rest of the basic systems; there are components of each of these in the ability to hold both eyes on a task – Fixations.

The second one, Saccadics: this is the ability to move eyes quickly and accurately from target to target; jump fixations. This ability is very essential to copying from a book to a piece of paper. It is very essential if you hope to show him something on an experience chart or a chalk board and have him put something on paper that resembles it. He had to be able to inspect back and forth with his eyes.

The third: Pursuit; the ability to follow a moving object. And the final one: Rotations; the ability to move eyes freely or accurately in all directions. I have a lot of colleagues in this room. They are here for the same reason I am – because they are interested in perhaps getting some answers to many questions. They may not be happy with what I am going to say, and still I do not think they would be particularly unhappy because they *are* here looking for answers. If there was only one thing you could do outside standard curriculum design, I wish every one of you would work with your youngsters in the development of ocular motilities.

I grew up in a small town in Northwest Iowa. When I was in high school, (which was a long time ago, as you'll soon see,) we could take "normal training". If we took two years we got a better country-school than if we only took one year of normal training, but we could always get a job teaching in a country-school if we took normal training in high school. I only took one year before I found that was not the way I wanted to go. I remember very well Miss Raugh, who taught every one of us in normal training classes how to teach children to move their eyes. Somehow or other, today we think that if they can hop, skip and jump in kindergarten, they can move their eyes in third grade.

The next level is Speech Motor Systems. I am not a speech person! I am not a speech therapist. I am tremendously interested in communication, which is done between human beings via speech; In one way or another via symbolism. I am particularly interested in it because of its visual components, and so I list three areas here that I think are very important for consideration.

The first is the babble of the very young child. Babbling gets the speech-action system to going; thus it has a very good purpose. The second bead is the imitative speech system. As I watch them and observe how they learn to talk it seems to me that a child learns to talk by imitating others. As an example I can put all of you present here, into the imitative speech level. Will you please say this word: episcatistor. Say it, please. (LAUGHTER) All right. Now how many of you know what it means? Oh, come on, it's a good, legitimate word. You were all imitating. We do it all the time when we get a new word. This is the way the child comes along. The important thing here is that this is the way he begins to check his labels with somebody else. This also is an environmental spatial orientation. I am most interested in some of the people like Piaget, and others, who express their opinion, that the early speech of the child is action speech – to express movement.

The third bead in this level is O, standing for original speech. Jerome Bruner uses these two terms: imitative and original, a little differently. He calls the first one, imitative: *a listen decision;* all you have to do is listen and you say what you heard. The original speech level is *a speak decision.* Here you crave to put it into your own words. The visual component that interests me here is the ability to visualize. I have a strong feeling that a large number of the people in this room tried to see the word "episcatistor" as well as hear it. This was one of your ways of checking: "Have I ever seen it before? Do I know what it is? What do its parts look like?" The first portion, "epis", you can begin to match with some parts of other words.

I am particularly interested in this speech level, because the next level, is another level we take for granted in children. We are glad if some have it and heartbroken if some haven't, and forget that it also is a learned process. This is the visualization process. Too frequently we pass it off by saying, "Well, he has a good memory," or we say, "He doesn't have a good memory." I think memory has heavy doses of visualization in it. And I think further that skill in visualization may come more out of the speech process than it comes out of the ocular process. But I see a close relationship between speech and vision. Vision, as I have defined it, — — the ability to interpret the visible world on the basis of all previous experiences.

The visualization system we are concerned with in children, as I have listed them here, 1) the immediate visualization process, which you're using right now as you look up at the diagram and look back at your notes to put it in your notebook. You are working here and now — but you have to carry that visualization from here — the screen — long enough to get it on your paper there.

The second bead is P and F: Past and Future; the ability to visualize what you did yesterday and the ability to visualize what you might be doing tomorrow. I hope that if I were ever to teach a group of first-grade children, (if I had my life to live over again, I'd go back and be a kindergarten teacher) — but if I were to teach children of this age, I would be very sure the child I had picked to lead them out during fire-drill, had high visualization skills. I certainly would want him to visualize the front door in that school building before he leaves his desk. Visualization is an action system. I call it so because it is learned; it is put together out of the actions of the child. Too frequently we just say, "Well, he's got it" or "he hasn't got it." We certainly have not given visualization skill enough attention and consideration.

This diagram tops off with a large circle labeled P: Perception. Why am I going to all this great detail? For two reasons, First, to organize my own thinking on the processes involved in the development of perception – the ability that I must deal with clinically in my office when children are brought in, because of difficulty in school. Having so much trouble that the parents say: "He's smart in everything but school work." (LAUGHTER) I hear it every singie day that I'm in my office.

But I made the diagram for another reason. Because I hope it will stimulate you to try something. I hope you will go back and look at the motor system on the basis of "What can I help the child do with his motor systems to lay foundations for a better chance of academic success." What is coordination? Control of the motor system. My feeling is that we usually deal with children, when we're talking about training perceptual skills, somewhere on the 5th level of the diagram. The fifth level I am talking about is the speech motor area: we talk 'em to death – and I suspect that because we know the word, we assume they'll know it. (Maybe some day I'll tell you what an "episcatistor" is.) But in the meantime let us all look at these underlying systems as the locus of the origin of perception. After all, the child is a unity; we no longer can talk about mind or body; we can no longer talk about the psychological readiness, or the maturational readiness, or auditory perception, or on and on and on. We talk about the child, the unity. We have given it lip-service for many years. We say, "Oh, the child is a total child." We deal with the total child – and what do we do? We put him into tasks that take him apart.

I would like you to play with this diagram then on the idea that maybe this is a way to start moving in on youngsters to help them organize their *own* learning motor processes. No matter what we lay on comes off like frosting – unless they can build it in for themselves. He who said: "Experience is the best teacher," I am quite sure had this same diagram in mind.

One more thing I want to emphasize to you. If you program these activities that we have indicated in this diagram: general motor activities, special motor activities, and so on – it is my sincerest conviction that you have to be sure there is also a visual decision within each of them, or you are not developing *perception.* Now do you get what I mean? That if it is going to be hopping – he has to hop to the visual goal. He has to have a visual decision involved in what his hopping accomplishes!

We can help children become physically fit. We can now assist children to become perceptually fit. And I think our purpose here today has been the exploration of the development of perception; and how we can help children achieve it. (APPLAUSE)

(END OF TALK)

DISCUSSION

DR. SILVER: In his paper Dr. Getman outlines a scheme for the development of perception and of learning in which he traces an heirarchy of skills; starting with what he calls "innate response systems", through gross motor activities, to more specialized motor systems represented by eye-hand coordination. From there the hierarchy reaches upward toward the apex of a pyramid; from the control of ocular muscles, to the development of speech, and finally, to the development of associations through the awareness of a percept in time and in space. Dr. Getman further strongly states that before adequate learning can occur, the intactness of each of these hierarchal systems must be established and that ocular motor patterns are key factors in the development of speech and of learning.

It is clear that he has thought long and thoroughly about his subject and brings to it a vast experience as a teacher and as a clinician. Yet, his paper leaves me strangely disquieted. For two main reasons. In the first place, his theoretical formulation of the development of the visual motor complex adds nothing to our understanding of the development of speech and language. And in the second, the hypotheses that intact hierarchical systems are needed for learning, and that ocular motor patterning is a key to learning, are unfortunately not presented as hypotheses to be tested, but as facts to be applied in a system of education. And even though Dr. Getman has reiterated the fact that these are hypotheses, he also reiterated the fact that if he had a choice he would teach all children the control of ocular muscles.

Let us consider the first criticism, namely, that our understanding of speech and language development is not enhanced by this theoretical hierarchy. After slowly taking us through early motility patterns and selective responses – I might emphasize selective responses – as the hand-grasp and light reflex, more advanced coordinated motility as walking, running and eye-hand coordination are developed.

From here on the transition is more rapid, and very difficult to follow. Selective ocular motor patterns are mentioned. And then in the next sequence of Dr. Getman's schema the child is not only

talking, but is producing "original speech". This to me is a prodigious leap over the very areas which I would like to explore. To me, then, this sequence is not helpful in understanding the development of language at all. After all, most vertebrates also go through the same sequence of development though the ocular motor system and speech, as we know it, is not present. A pigeon, for example, can be taught to discriminate between a circle and an ellipse, and can even distinguish between a horizontal and a vertical line; a really advanced visual percept. This is a far cry from speech.

Regretfully, whatever it is in man which makes for language is not elucidated in this scheme. Some questions which might be asked are: what is the relationship of perception to the acquisition of language? Will motor training hasten the acquisition of language? Is there a more fundamental problem — perhaps cerebral dominance — which underlies both perception and language? Strangely, the problem of cerebral dominance is mentioned only indirectly, when in discussing the tonic neck reflex, it is said that this reflex cannot really be related to dominance because the infant will exhibit both the right and left tonic neck posture.

I realize, of course, that I am asking for a great deal, and it is not to Dr. Getman's discredit that he does not solve the problem. No one else has. I should like only to emphasize that his structure is but a theoretical one, and that the sequence of maturation and his emphasis on specific aspects of maturation are as yet a matter of opinion.

My second disappointment in this paper is much more important, namely, the contention that intact hierachical sequences as outlined, are needed for learning; and further that ocular motor patterning is the key to learning. These ideas as I've said, are presented as facts and not as hypotheses they really are. I would like to see some specific questions asked. Just what is the role of voluntary movement of the external ocular muscles in the development of perception and in the development of language? Will eye muscle training result in improved perception and in improved language skills? What is the role of general motor activity, such as crawling or balancing on a board? What is their role in themselves and what can they contribute to the development of perception and of language?

These, of course, are complex questions. Yet controlled experiments must be conducted for reasonable answers, and certainly before ocular motor training is instituted in the schools. For myself I must at this point question the validity of these hypotheses, especially

that involving the voluntary movements of the external ocular muscles. Some 35 years ago Orton said we do not read with our eyes, but with our brain. Certainly, children with congenital nystagmus may read well, and those with external ocular imbalance, even to the point of diplopia, soon develop a new macula which in time ceases to function and the diplopia disappears. The voluntary control of eye movement in pursuit patterns is but one small component of a complex system, involving not only the supranuclear impulses from premotor and occipital cortex, but also subcortical impulses from vestibular, cochlear, cerebellar and geniculate systems. The cortical representations, are in addition, bilateral. So that training of voluntary eye movements would not seem to enhance the establishment of cerebral dominance, nor would it enhance accuracy of perception and appears in our experience to have very little to do with the acquisition of reading.

Certainly, visual perceptual defects can be trained without specific training in voluntary ocular patterns. More over we have, in training children with specific reading disabilities, frequently observed changes in the visual gestalt function, from primitive vortices and loops to horizontal and vertical lines, to the ability to recognize and reproduce diagonals and angles. In adults also, recovery from aphasia has a parallel recovery in the visual gestalt.

If we are to consider the role of ocular motility in perception and in language, I should like more clearly defined, what ocular motor patterns are we studying? What is the incidence at various ages? What is their distribution in children with and without specific learning defects? What associated findings, neurologically, perceptually and educationally are present? I think only then will we make a beginning in understanding the role of ocular motility.

But this is not to say that eye muscle movement is not important. We also find ocular motor disturbance in many children with learning difficulties. But these findings may be, for example, the presence of nystagmus on lateral gaze, difficulty with convergence, pupilary irregularity, dystonic muscle movements. Our interpretation of these defects, however, is that they are but one external evidence of central nervous system defect and, where the eye pathology is found, we find further evidence of structural defect in the central nervous system, including perceptual defects in various modalities. The eye muscles do not escape from dystonic abnormalities which may beset other voluntary muscles.

Also, because of the position of the ocular-motor and trochlear nuclei, they are particularly vulnerable to any disease involving the periaquaductal areas, and particularly susceptibie to injury with any increased intercranial pressures. The eye muscles then become a part of the general neurologic study of each child. Our therapeutic efforts are directed at the underlying disease and at training the associated perceptual defects. This involves an assessment of the individual patterns of each child and the application of individual remedial methods.

That perceptual abnormalities are caused by defects in ocular pursuit patterns has yet to be proved. That perceptual abnormalities may be associated with the external and internal muscle defects has been proven. But both defects are manifestations of central nervous system pathology, either developmental or structual. It also has not been proven that training of the voluntary component of eye muscle movement can improve perception and learning.

Similar reasoning applies to insistance upon a strict hierarchal structure based on motility for optimal learning. First, the hierarchy is only theoretical. Second, there is no evidence that peripheral motor defects are causal in production of perceptual and learning problems. Third, where perceptual defects exist, with or without peripheral motor defects, they are symptomatic of underlying central nervous system dysfunction, and it's the underlying dysfunction which needs remediation. Fourth, the training of gross motor functional patterns, such as balancing on a rail has not been proven to improve perception and learning. (APPLAUSE)

DR. ROSA HAGIN: This is the fourth time that I've attended conferences sponsored by the Language Center of Middlesex General Hospital. However, I'd like to think back to about 5 years ago because I believe I see each conference through the eyes of one person in that audience at that first meeting. She was a fifth-grade teacher who looked a little plump; (too many school lunches?), but had an air of authority (you could see her managing a school playground). Midway in the discussion she stood up and said, "Please tell me something I can take home to my fifth-grade classroom and use." I shall keep this teacher's question in mind as I discuss Dr. Getman's paper for I hope to consider first his theoretical model and second his training methods from the point of view of valid and relevent application in a typical classroom.

Theoretical Model of the Visuomotor Complex

Dr. Getman's paper expresses some dissatisfaction with what he calls "current philosophies of the process of learning". He tells us that "mental life is motor life" and that the importance vision, as he defines it, is not completely appreciated by those who teach in the schools. He defines vision as a complex process involving an ebb and flow of relationships among locomotion, location, labelling, and language. He uses the term "vision" somewhat in the manner that we in our work use the term "visual perception", but I do not think we really differ on this point. In the sense that we use it, visual perception is defined as "The experiencing of form and pattern upon stimulation of a receptor modality." Dr. Getman's paper explains the development of visual perception in children through a model which offers a hierarchy of skills. In this model there are some statements which have valid support in the literature of child development; with these I will have no quarrel. Some statements may be so, but are purely theoretical at this point. I hope they will be studied objectively. Finally, there are some statements I find I must question. For example, Dr. Getman says in his paper, "The fact remains that the movement of the eyes must be developed and controlled in a special manner for success in the classroom. The children living in the lowest academic third of the classroom will demonstrate inadequacies of ocular mobility". It seems to me that underachievement is not that simple.

First of all, classrooms even in so small a state as New Jersey, differ very much. We have urban schools, rural schools, suburban schools. We have schools where there are the things to teach with and the schools where there aren't; schools where there are 25 in a class and schools where there are 39. In short, the lowest academic third in one classroom may be very different from that in another. Second, I think in trying to understand this lower third of the classroom, we must take into account the variations in abilities within a child. Few children "live" in the lowest third in all subjects. For example, some may do poorly in the language arts, but do well in arithmetic, or art, or industrial arts.

Thus it seems to me that school placement in the lowest one-third of the class does not depend upon one factor. There are many, many variables: variations within a child; variations among children; teacher-child interactions; child-child interactions; and compensations that the child may make for his disabilities. Learning is a complicated

transaction, and all underachievement cannot be explained through *one* aspect of *one* sensory modality.

Dr. Getman goes on further to say that "While some people may not agree with some details, the model is valid enough for further theoretical exploration and clinical application". I think he has left something out between the stages of exploration and application, and that is research, the testing of procedures in a controlled setting. Certainly there are difficulties involved with testing teaching procedures. We are doing this sort of experiment now at New York University School of Medicine and can appreciate all the hazards in designing educational research. However, I believe it is a necessary step before one can recommend application of Dr. Getman's model. Otherwise, it seems to me, clinical application is premature.

To support the training programs which Dr. Getman advocates, he gives us, instead of data drawn from research, testimonials such as, "Many teachers have reported," or "Suffice to say that results would have to be seen to be believed", or "Programs are already being utilized by adults concerned with both the special and the usual child. The results of these programs are coming in, and without exception the adults involved report real and unexpected progress among children who were previously thrown away". It would seem to me that such a carefully thought out theoretical model deserves a carefully planned experimental validation as well.

CLASSROOM APPLICATION

Because I am concerned about practical ideas for the fifth grade teacher I mentioned earlier, I went beyond the paper Dr. Getman sent to today's discussants to learn about the actual teaching program he recommends. He offers three sources in his paper: one is an unpublished dissertation, one is to be published in 1966, the third is, *How To Develop Your Child's Intelligence!*.[1] Therefore, the comments I make about the teaching procedures will be drawn from this book.

I have no quarrel with a number of the things he says about the development of children:

> "The child's first teachers are his parents."
>
> "modern living deprives the child of simple experiences with common things, a wall switch is a poor teacher. A child needs to explore and participate".

1. G. N. Getman, How To Develop Your Child's Intelligence. Luverne, Minnesota: published by the author, 1962.

"Reading is more than seeing words."

"Some present-day teaching of reading has not been enough concerned with perception".

In addition, this book describes some ingenious and varied activities to teach general movement patterns, special movements patterns, eye movement patterns, vision and language patterns, visualization patterns. Some of them are very simple and accessible; others need more complicated equipment, like trampolines. However, as a teacher and psychologist I am troubled by some of the over-simplifications in these descriptions. For instance, the problem of skipping words and lines in reading is attributed to the lack of rhythmical eye movements. I think this may be an oversimplification of the reading process. Reading is more than perception; reading is thinking. A number of hypotheses maybe considered in the case of the child who omits words and lines. There are children who are doing very well with the perceptual process of decoding the letters, but they are not interested in making sense of what they read. They just go along and skip a line or skip a word and will be completely untroubled by it. It may be that the material is too difficult and we find them an easier book. It may be this is a child who is too compliant. He may need appropriate questioning to help him to think actively and critically as he reads. Or it may be that he has a figure-background problem so that he loses his way in this context. If it is this kind of perceptual problem the child may need a line marker or color cues as guides. These are only some of the many hypotheses one might examine to find out why a child is skipping words as he reads, before we attempt to train eye movements.

TRANSFER OF TRAINING

I think Dr. Getman's work also raises the question of transfer of training. Now remember, our teacher studied educational psychology at college, and I'm sure she heard about the problem of transfer of training in the early literature of educational psychology. Transfer occurs when there are common elements in the two skills involved; one practices one thing in order to improve a related one. Dr. Getman offers us "Angels in the Snow" as a technique by which "the child can gain body flexibility". The child, while lying on his back on the floor, moves his arms from the sides of his body upward

until they're over his head; he moves his feet apart at the same time. The name comes from the game the children play in the snow. If they moved their arms and legs in this fashion, they'd leave an impression of an angel-like figure. Dr. Getman says, "many teachers have reported the improvements noted in children who had daily opportunity for this practice. Improvement in handwriting was one of the most observable changes. But hand and eye coordination and reduction of distractibility have also been noted."[1] It seems to me we have little validation for this, and I have seen many children who were good swimmers and who have practiced these same movements many times in the water who still needed much, more work on the finely coordinated movements that are part of handwriting.

OVEREMPHASIS UPON VISUAL PERCEPTION

It seems to me that Dr. Getman's teaching suggestions overemphasize visual perception. Classroom learning on the otherhand involves a great deal of talking and listening. There are some interesting studies in process analyses in classrooms done by Marie Hughes and a group at the University of Utah.[2] They recorded segments of class discussions. When records were coded, it was found that from 60 to 70 percent of the time the teacher was doing things like structuring, controlling, facilitating, demonstrating, judging, supporting, admonishing – she was talking to children. Much of teaching involves talking, and much of the learning involves listening – To me these skills should not be under-emphasized. I think there is danger in emphasizing visual perception to the exclusion of other modalities. The creative adult is frequently one who enjoys all kinds of sensory experiences. For example, one who appreciates the texture and contour of objects depends more upon the tactile than the visual modality.

Finally, Dr. Getman says that what he offers are guidelines for enrichment programs for all children, "to guide them to positive, maximum growth". I must admit that I'm in favor of positive maximum growth, but I'm not sure that all children need perceptual training in order to achieve it. I think that one must remember that this is training; this is not self-determined training; it is adult-selected

1. G. N. Getman, How To Develop Your Child's Intelligence. Luverne, Minnesota: published by the author (1962) p. 42
2. M. M. Hughes and Associates, The Development of the Means for the Assessment of the Quality of Teaching in Elementary Schools. University of Utah (1959)

content, and results in adult controlled activities. We know that learning is facilitated when a learner is aware of the purpose of the activities and the progress he is making and when he shares in the planning. This training is directed by adults.

Sometimes we find that even teachers will be confused about the purpose of perceptual training activities. We visited some classrooms, where the teacher was using a whiffle ball, asking children to follow it visually as it swung suspended from a string. The teacher was asked afterward, "What does that do for your pupils?" And she said she didn't know. "Well, why did she use it?" And she said, "Well, that's what I was taught at the University." It seems to me that the whiffle ball might provide training for some specific purposes, but the purpose must be understood by the teacher, and also by the learner before it can be used effectively.

I believe that perceptual techniques are highly specialized. I think they should be defined in terms of purpose, content, procedures, and mastery criteria. This last determines how long one stays with a given training technique. We have been using the "3 x 3 rule" in our work: 3 correct performances for 3 consecutive weeks. We use this method to be certain that a skill has really been learned.

SUMMARY

I share Dr. Getman's interest in perception and its relationship to learning and I agree with much of what he has said in terms of child development concepts. I am concerned that his training procedures have not been tested through careful sampling and controlled research. I'm concerned about oversimplification and lack of specificity. For example, I believe the process of learning language has been oversimplified in his formulation. I believe that abnormal eye movements as a cause of reading disability have been overemphasized, although for the reasons Dr. Silver has stated may be important diagnostic indicators. I miss the specificity of diagnosis we have found necessary in our work. I feel a lack of specificity in descriptions techniques: their purpose, their results, their appropriate use. I do not believe perceptual training is for all children, or even for all children with learning difficulties. (APPLAUSE)